Teaching and Evaluating Research Skills

von Eije, Johan; Jaklofsky, Tanja

Publication date:
2015

Teaching and Evaluating Research Skills

Henk von Eije and Tanja Jaklofsky *

Abstract: We present a method to analyze the relation between faculty wide intended learning and concomitant achieved learning outcomes empirically. The method is applied to the Master of Science in Business Administration (MSc BA) program of the Faculty of Economics and Business (FEB) of the University of Groningen. Intended learning is measured from the students' exposure to seven research aspects taught according to course specific learning goals. The achieved learning outcomes are derived from the grades that the FEB professors gave on these research aspects when grading the students' final Master theses. We find that the intended learning of the research aspects in the MSc BA program does mainly benefits students with no previous Bachelor of Science background at the FEB. We expect that our method may also be relevant for accreditation committees/managers of other Business Schools. Moreover, the results of this method may be interesting for professors who teach -or intend to teach- research skills.

Key words: analyzing teaching outcomes, intended learning outcomes, AACSB, research skills

JEL code: A 230

- Both authors are working at the Faculty of Economics and Business of the University of Groningen. The first (corresponding) author can be reached through e-mail at j.h.von.eije@rug.nl**.** A short (6 page, 1 table) version of this paper is presented at the First International Conference on Higher Education Advances (HEAd'15) in Valencia, June 24-26, 2015.

1. Introduction

In order to be eligible for accreditation of the Association to Advance Collegiate Schools of Business (AACSB), a business school has to prove its quality based on global standards. These standards aim at supporting and encouraging excellence in management education. A major criterion is that the business school is clearly able to achieve its targets.[1] In this paper we report on the MSc BA of the Faculty of Economics and Business (FEB) of the University of Groningen. We analyze empirically whether the program of the business school indeed results in achieving the school's research targets.

In line with the mission of the University of Groningen, the FEB strives to teach research skills to students. The basic research skills are taught in the Bachelor programs of the FEB, while more specific research skills are acquired by students in the Master program of the FEB. The writing of the Master thesis is the capstone of the Master's program of the FEB and the students have to show in how far they mastered the required research capabilities. Research capabilities are measured after the deliverance of the Master thesis through seven items. These items are assessed by the professors of the FEB, and they grade each item with a Likert-type scale. The FEB -and the AACSB- require that the items are also explicitly taught in several courses that precede the Master thesis.

We study the relationship between the program at the Master level and the actual outcomes of that program, and hypothesize that the exposure of students to the teaching of the research aspects in the courses of the program influence the Likert scale scores that students receive on the seven items that form the basis for their final grade of their Master thesis.

This paper contributes to the knowledge of teaching and learning in various ways. First, it shows how the National and AACSB accreditation processes helped in making the professors accountable for the incorporation of research targets in line with the ultimate program aims. Second, the paper tests whether all the seven research items do indeed have a significant and positive relationship with the final grade of the Master thesis.

[1] AACSB accreditation procedures are available at the AACSB-website (AACSB International, 2013).

Third, the paper also tests whether the various specializations within the FEB reward the students similarly or not. Fourth, the paper shows that a varying background of students and a wide range of course choices result in students that are exposed differently to the teaching of research skills in general and to the seven research skills required by the FEB. This allows us, fifth, to study whether exposure differences do matter for the FEB and whether the exposure is adequate to get a sufficient grade for the Master thesis and for the seven research items. Sixth, we analyze whether –besides background characteristics- the general capabilities of students and the exposed teaching to the seven research skill items matter in getting a higher result on the capstone Master thesis.

On a general level, our paper analyzes the relation between the intended program of a business school[2] and the actual outcome of the program. More specifically, our research reveals if there is a relation between teaching of complex (research) skills and the mastery of students of those skills. An additional feature is here that the program of FEB only takes one year, and one may wonder if complex research skills can indeed be mastered in only one year, or whether additional exposure of students to the teaching of such skills should be recommended. Of course, the latter will only be relevant if more exposure to the teaching of research skills also results in improved research skills.

We think that not only the FEB, but also other Collegiate Schools of Business might profit from our research, as each business school that wants to analyze the results of its teaching might apply similar methods in assessing the relationship between the intended program and the outcome of the intended program. This is in particular feasible if the required skills are also measured at the end of a program and if the exposure to the teaching of these skills varies over students.[3] In these situations, we would even like to suggest that such analyses are taken into account in future AACSB (re)accreditations.

[2] Intended learning outcomes shift "the emphasis from input and process to the celebration of student learning" (Allan, 1996, p. 93). It is therefore not only important to know whether the intentions are realized per course, but also at the curriculum level (Harden, 2002).

[3] In contradiction to research summarized by Belland et al. (2009), we assess ultimate faculty wide targets that are incorporated within a multitude of courses. In line with some of the summarized researchers we use student grades by which to assess the curriculum.

In section 2 we describe the background and the intended program at the FEB as well as the criteria used to evaluate the Master thesis. Section 3 presents the data and the methodology. Section 4 shows the empirical results. Finally, section 5 presents the conclusions and limitations as well as ways for further research.

2. Background

The AACSB requires a clear mission statement from Business Schools that strive for accreditation and that the Schools are able to prove that they achieve their mission. For the programs of the FEB this implied, first, that it formulated its targets (learning goals) (and sub-targets; measurable objectives). Second, it should be able to prove that these targets are met. Third, the combination of courses of the intended program of the FEB should cover the sub-targets and thereby –ultimately- its overall target. Fourth, the FEB should have a system in place that guarantees that the sub-targets are indeed taught and that the quality of teaching is evaluated. Fifth, actions should be taken if the quality of teaching is below the required level (leading to continuous improvement). In this paper we, primarily, focus on a rather implicit issue, namely on the assumption that the teaching of sub-targets set in the intended program of the FEB indeed influences the grades on the research sub-target positively. In section 2.1 we present an example of the intended program of the FEB, which makes it later possible to show how we measure the students' exposure to the research items. The main FEB target and the sub-targets set by the FEB in the Master thesis are presented in section 2.2.

2.1 The intended program at the FEB

The FEB had a grading system in place (see section 2.2), but the items on which the Master thesis was graded were not always explicit in the teaching of the separate course dossiers. For the national assessment the FEB asked all teachers that were involved in the Master courses of the several Master programs to indicate (and to prove how) the various aspects on which the Master would be evaluated were taught in their courses. This resulted for each course in one or more items that were taught. The resulting system also

covered the aspects assessed by the AACSB. Table 1 gives an example of which research items are taught in which course (in this case for the MSc BA sub-specialization Business Development).

Table 1 about here

2.2 Criteria used to evaluate the Master thesis

The passing grade for the thesis is a 6 (out of a range from 1-10) and the maximum grade is a 10 (excellent), though the grade 10 is very exceptional for a Master thesis. In fact even the grade 9 is relatively rare. The grading system at the FEB is not a relative grading system, but it is based on a ratio scale, where the numbers are rounded into grades. A similar grading system also applies to the Master courses. The seven evaluated research items are:

1. ***Introduction***. This requires from the professor an evaluation of the initial motive, an assessment of the relevance of the problem from academic and professional perspectives, and an evaluation of question whether the problem is approached systematically.
2. ***Research framework***. This requires the professor to judge whether the problem is adequately grounded in the literature, whether concepts, definitions and relations are clearly explained and placed into a conceptual framework, and whether the research objective, and research questions and/or hypotheses are clearly formulated.
3. ***Research design***. This item requires that the professor evaluates whether the research method is well-argued, transparent and appropriate, and whether the data are adequate and properly used and whether the student is aware of the data limitations.

4. ***Analysis and discussion***. This item requires that the professor evaluates whether the research data are adequately presented, analyzed, interpreted and discussed and (if appropriate) whether the findings lead to the design of a solution.
5. ***Conclusions and recommendations***. This item requires that the professor evaluates the relevance of the conclusions and whether the thesis conclusions are related to the thesis objective, the research question(s) and whether they are based on research results. Moreover, the professor has to assess whether the recommendations are concrete and related to the conclusions and whether there is a critical reflection on the research.
6. ***Report***. This item requires that the professor evaluates whether the report is well structured and divided into chapters, sections and paragraphs, that the references to literature are complete, consistent and correct, and that the argumentation is clear and convincing. Moreover, spelling and style should be correct, and, finally, the report is assessed on. comprehensibility and lay out.
7. ***Process***. This item requires the professor to assess whether the student worked independently and made effective use of feedback. In circumstances that the students give a presentation of the Master thesis (required in some specializations), it must be assessed whether the report has been explained, presented, and/or defended effectively.

3. Data and methodology

3. Data description

The dataset we use is based on the students that finalized their Master program in the period 2008-2011. For these students we selected students who were exposed to courses with at least one research item before finalizing their Master thesis. Moreover, for these courses the students should have received a numeric grade. For each student there should also be a fully completed assessment form available with scores on all the seven Master thesis items. As some students wrote two Master theses, we discarded with the courses after the finalization of the first thesis as well as with the second Master thesis. This procedure resulted in 692 students with a first Master

thesis. Table 2 provides the mnemonic codes and the characteristics of the relevant variables for our analysis.

Table 2 about here

Table 2 shows that the average grade on a thesis is 7.205. This is in line with the fact that a student cannot pass with a grade lower than a 6 (125 students or 18%), and that above normal scores of 8 (195 or 28%) and 9 (36 or 5%) are possible. The table also shows the assessment of the professors on the seven items that are considered relevant by the FEB (presented in section 2.3) in being a good researcher. These items are assessed by the professors of the FEB with a Likert scale, ranging from below standard, standard and above standard. Some students cannot be evaluated according to these three Likert scale grades, and then the professors provide two assessments. For example, if it is not possible to strictly distinguish between "Standard" and "Above standard", the professor may fill in both "Standard" and "Above standard". For that reason we rescale the original Likert scale of three issues in a scale with 5 issues, where "Below standard" equals 1, a score between "Below standard" and "Standard" equals 2, a "Standard" score equals 3, a score between "Standard" and "Above standard" a 4 and "Above standard" a 5. (See the Appendices, table A-1 for the number of students with each Likert scale grade). Using this five point Likert scale shows that the highest "average grade" for the Likert scale is given on the process (3.533) and the lowest is given to the conclusions and recommendations (3.001).

We then measure the exposure of students to research skills teaching. This is done by analyzing the actual courses that the student passed successfully. For each course with research skills we know what research items the course covers (see the example in Table 1). Each of the covered items is then multiplied by the number of course hours. For each EC from the European Credit system 28 hours are allocated. Then all the hours for each item are summed over courses preceding the Master thesis and the outcome is then divided by the total number of official student hours in the 1-year Master program, namely 1680. Table 1 shows that this is on average 0.407 for item 1as is indicated by the variable "Exposure to item 1", or E1. The average of the value on all seven items is represented by the variable "Overall exposure to research skills

teaching", or OERST. For this variable the average value is 0.322[4]. One may note that the variety of exposure to research skills teaching is relatively large. One reason for this is that the students can chose between nine programs within the MSc BA of the FEB. Another reason is that some students who started before the AACSB requirements were set were allowed to finalize their Master. Moreover, quite a number of other students followed more courses than the minimum number required by the official minimum requirements set by the FEB. It may now already be noted that the large variety of choices available to the students made it possible to assess the impact of the exposure to research skills teaching on the final assessments at the end of the Master program. It may, furthermore, be noted that the exposure of students to the teaching of research skill items is quite diverse. The students are relatively less exposed to the item "Conclusions and recommendations" (item 5) and "Research design" (item 3) and most to the item "Introduction" (item 1). Moreover, the exposure of students differs per item for the various sub-specializations of the MSC BA program of the FEB (for additional information and information on the sub-specializations see the appendices, Tables A3-A7).

We also measure the quality of the students, by calculating the average grade that a student received on all courses before finalizing their Master thesis. This grade includes all failures (with grades 1 till 5 included). For that reason the student with the worst quality was able to get an average grade per previous attempt (AGPA) of 4.38, despite of the fact that the grade 6 is required for passing a course. It may be noted that there are 47 observations missing. This is caused by the fact that some students received a verbal grade on one or more courses, and such a grade cannot be included in calculating averages. Besides the quality of the student we also measure the gender of the student (1 being a male, 0 otherwise) and whether the student was an external student, or had a Bachelor degree from the FEB (1 being an external student, 0 otherwise). As can be seen from Table 2, 66.8% of the students is male and 42.3% of the students has an external background.

The FEB aims that at least 80% of the students score at standard or higher on each research skills item. When less than 80% of the students score standard or higher there is an important policy issue for the FEB (also stressed by the AACSB accreditation committees). Therefore we show in table 3 the percentages of students that score on each of the individual research skills items

[4] It is tempting to conclude that therefore on average 32.2% of the official Master time is research related. That is, however, not necessarily the case, because the relative time weights of the research aspects within a course are unknown.

standard or higher. We add to that table also the results of the Master thesis and we distinguish several groups.

Table 3 about here

Table 3 shows that female students score for all research items more often standard or higher than male students. This is also the case for the thesis grade. Except for item 2 (research framework), internal students receive more often a standard or higher evaluation than external students. Students are also dichotomized in the group of students with an average grade per previous attempt below the median (Low AGPA) and students with an average grade above the median (High AGPA). Here students with lower previous quality receive less often a standard or higher grade. Overall, less than 80% of the students score standard or higher on the items 2 (research framework), 3 (research design), and 4 (analysis and discussion). The items 1 (introduction), 6 (report), and 7 (process) compensate for the underperformance on these issues, because ultimately 81.9% (=100%-18.1%) of the students score a standard grade of 7 or higher on the final thesis. We may thus conclude that the aims of the FEB are met with respect to the final grade, but not with respect to all the items specified by the FEB as being important for becoming an adequate researcher.

4. Research skills assessments

Research skills assessment items 1 till 7 are evaluations of the seven research skills defined by the FEB. They form the intermediary between the final result on the Master thesis and the teaching of these research skills. It is therefore interesting to analyze what the weights of these assessments are in generating the Master thesis grade (section 4.1) and, whether, and if so how, the exposure to the teaching of these skills affects the grades on these items (section 4.2).

4.1 Research skills and the Master thesis result

We first test how the seven items influence the final grade on the Master thesis. If an item is relevant, a higher Likert score on that item should result also in a significantly higher grade on the

Master thesis. If one or more of the seven items do not show a positive and significant effect on the final Master thesis result, the item is considered to have low relevance for the professors of the FEB. The minimum requirement of the grade 6 and the rounding of the grades imply that the grades become discrete numbers. Therefore we use ordered probit analysis to explain the grades.

Besides the seven research items, we include the student quality measured by the average grade on previous attempts (AGPA) and the gender and the external student dummies in our analysis. We assume that there exists a positive relationship between the previous quality of the student and the research item grades. From table 3 we learned that female students outperform male students, though this is not necessarily the case if one also considers the fact that the evaluation of the Master thesis is based on the seven research skill items only (on which female students also outperform). Similarly, external students may have lower results as indicated by table 3, but again this does not have to be the case in the multiple probit analysis. Table 4 shows the results of that analysis (without reporting the intercepts).

Table 4 about here

Panel A of table 4 shows that the Master thesis grades are positively related to all the scoring items used in assessing the research capabilities of the students. Moreover, the results on all seven skill items are significant in explaining the grade of the Master thesis[5]. This is also the case for the average grade per previous attempt (AGPA). The latter relation suggests that individual student quality is relevant in grading the final Master thesis besides the seven scoring items. The gender and external student dummies do not influence the grading significantly if the teachers' Likert scale grades on the research skill items are included.

Except for the introduction and the report (items 1 and 6) Panel A of Table 4 shows that all items score above 0.4, with item 3 (the collection of data and methodology) even with a weight above 0.5. This suggests that all items are assessed together by the professors of the FEB in generating a grade on the Master thesis. We test if there is only one factor by applying factor analysis to the

[5] This implies that we assume that the causality runs from the thesis grades to the master thesis grade and not partly vice versa when an intended master thesis grade would result in a higher grade for one or more other items..

seven assessment items. It proves that there are three factors. To these factors we apply minimum entropy rotation (Jennrich, 2004). In our case the minimum entropy rotation gave results that came close to well interpretable oblique methods, while retaining the advantage of still having orthogonal factors. It is shown in the Appendix (Table A-2) that the first factor is indicated by us as being the "overall quality of the thesis", as all scoring items load positively on this first factor. The second factor is dubbed "the analysts" factor, as it loads positively on the research design and the analysis and discussion of the results. We named the third factor "doers", as it loads positively on the conclusions and on the process (items 5 and 7), with negative scores on the more verbal aspects as research framework and the reporting (items 2 and 6). The first two factors influence, according to table 4 (Panel B), the grade on the thesis significantly, but the third factor does not have a significant effect. Again the average grade of the student on all courses previous to the thesis (AGPA) has a significant and positive effect, while the gender and external dummies have no effect.[6]

4.2 The teaching of research skills

It is shown in section 4.1 that the professors of the FEB base their final grade on all research skill items (factor 1), with some additional weight on analysis capabilities (factor 2). These two aspects make it also relevant to analyze whether the exposure to the teaching of these research skills affects the assessment of the professors. In table 5 we show how the final thesis grade depends on the student characteristics like the average grade on previous attempts (AGPA) and gender and background dummies and the exposure to overall exposure to research skills teaching (OERST). We show the ordered probit results (without intercepts).

[6] We found comparable factors when we included the average grade on previous attempts (AGPA) in our factor analysis of the seven items, where the average grade on previous attempts loaded most heavily on the first factor. The first overall quality factor then gathered a somewhat heavier weight in the regression equation too. This suggests again that general quality is a major issue for the FEB professors to grade a thesis. Nevertheless, we retained in the tables the distinction between the factors derived from the seven research skill items and the average quality of the student as indicated by AGPA. First because we intend to further analyze the impact of teaching on the factor seven research skill items, and, second, because it is to some extent amazing that the previous quality of the student has some effect besides the research skill items that should lead to a final thesis grade.

Table 5 about here

Table 5 shows that the overall exposure to research skills teaching (OERST) does not influence the final grade of the thesis for all students significantly. This is also the case for students with low and high grades and for female and male students and for internal students. However, external students do benefit significantly from overall exposure to research skills teaching. For that reason we proceed in table 6 with an analysis of the impact of exposure to the teaching of the individual items on the scores given by the FEB professors on the individual research skills respectively, while distinguishing between the effects on internal and external students. Because the research skill grades also follow an ordering from low to high (as indicated under table 2), we apply also here ordered probit analysis. We include again the average grade on previous attempts (AGPA) and the gender and background dummies. Moreover, we include for the teaching of each item also the interaction between the exposure of the students to the teaching and the external background of the student. Controlling with this interaction term implies that the exposure of teaching to an individual item represents the impact of the exposure to teaching on internal students.

Table 6 about here

Table 6 shows that the exposure of internal students to teaching individual items is only significant for item 5 (conclusions and recommendations), but negatively so. External students, however, do benefit significantly from the teaching of item 1 (introduction), item 4 (analysis and discussion), item 5 (conclusion), item 7 (process) and marginally significantly from item 6 (reporting). This is important, because such students would do worse without the teaching as shown by the significant negative signs of the external background dummy. Again students with higher quality as indicated by higher average grades on previous attempts (AGPA) do perform significantly better on all items, while male students do underperform on all items, and often significantly so.

5. Conclusions

Our paper analyzes the relation between the intended program of a business school and the actual outcome of the program. More specifically, we reveal if there is a relation between the intended teaching of complex (research) skills and the mastery of students of those skills. This is done by using grades for the capstone research Master thesis of the MSc BA program of the FEB and studying if more exposure to the teaching of each of the seven research skill items improves those grades. We find that all research skill items are important in assessing the final Master thesis. However, the exposure to the teaching of research skill items only influences the grades on the Master thesis for students with no Bachelor background of the FEB. The other students do not benefit from exposure to such teaching.

The finding that students without a background at the FEB benefit from such exposure suggests that there is at least a partial relation between the intended program of the business school and the actual outcomes. However, internal students do not benefit from such teaching. This may mean that these students received adequate teaching in their Bachelor at the FEB, and that one year of additional Master courses that also intend to teach specialization specific content do not bring students to an even higher level of research capabilities. These results would make it important for the FEB management to consider if the teaching of research skills should be improved for internal students, or whether it is satisfied with the low research skills benefits for internal students (who still have learned specialization specific content) and the positive benefits of teaching research skills for the external students. This choice was however never explicitly made, as there has been an overhaul of the program that focused even more explicitly on research driven education. We therefore suggest that the current –rather ad hoc- research is repeated for the FEB in the future regularly (Moskal, 2008). Such a research would, moreover, become more precise if explicit knowledge were available on the relative amount of time spend on teaching the several aspects in each course.

Finally, we think that not only the FEB, but also other Business Schools might benefit from our research, as each business school that wants to analyze the results of its teaching might apply similar methods in assessing the relationship between the intended program and the outcome of the intended program. We show that this can be done without having to have assessments of

students on separate research issues in previous courses if there is a relatively large choice of courses available to students.

References

AACSB International (2013), AACSB Assurance of Learning Standards: An Interpretation, AACSB International, Tampa.

Allan, J (1996), Learning Outcomes in Higher Education, Studies in Higher Education, 21 (1), 93-108.

Belland, B.R, et al (2009), Validity and Problem-Based Learning Research: A Review of Instruments Used to Assess Intended Learning Outcomes, Interdisciplinary Journal of Problem-Based Learning, 3 (1), 59-89.

R.M. Harden (2002), Learning outcomes and instructional objectives: is there a difference? Medical Teacher, 24 (2), 151–155.

Jennrich, R.I. (2004), Rotations to simple loadings using component loss functions: the orthogonal case, Psychometrika, 69 (2), 257-273.

Moskal, P., et al. (2008), Summary of Assessment in Higher Education and the Management of Student-Learning Data, Academy of Management Learning and Education, 7 (2), 269-278.

Table 1 Research items incorporated in the six main courses and in the Master thesis of the Business Development program of the MSc BA of the Faculty of Economics and Business of the University of Groningen

X indicates that a certain item is taught in the course; it may be remarked that the process is not taught any more in the thesis of the specialization in Business Development

AACSB objectives	Introduction	Research Framework	Research Design	Analysis and Discussion	Conclusions and recommendations	Report	Process
Buss. Dev. Management	X	X					X
Development research design	X		X			X	X
Field course A	X	X		X	X	X	X
Field course B	X	X	X	X	X	X	X
Service Innovation	X	X					X
Integral BD							X
Master Thesis	X	X	X	X	X	X	

Table 2 Descriptive statistics of dependent and independent variables, MSc BA cohorts 2008-2010.

External students are students with no Bachelor from the FEB.

Variable (Mnemonic code)	Obs	Mean	Median	Std.	Min.	Max.
Thesis grade	692	7.205	7	0.793	6	9
Introduction (Item 1)	692	3.273	3	1.088	1	5
Research framework (Item 2)	692	3.092	3	1.332	1	5
Research design (Item 3)	692	3.153	3	1.346	1	5
Analysis discussion and design (Item 4)	692	3.059	3	1.363	1	5
Conclusions and recommendations (Item 5)	692	3.001	3	1.181	1	5
Report (Item 6)	692	3.350	3	1.209	1	5
Process (Item7)	692	3.533	3	1.345	1	5
Overall exposure to research skills teaching (OERST)	692	0.322	0.310	0.135	0.036	1
Exposure to item 1 (E1)	692	0.407	0.417	0.171	0	1.250
Exposure to item 2 (E2)	692	0.352	0.333	0.166	0	1
Exposure to item 3 (E3)	692	0.239	0.167	0.158	0	0.917
Exposure to item 4 (E4)	692	0.323	0.333	0.177	0	1.083
Exposure to item 5 (E5)	692	0.234	0.167	0.155	0	1.083
Exposure to item 6 (E6)	692	0.333	0.333	0.159	0	1.167
Exposure to item 7 (E7)	692	0.370	0.333	0.180	0	1
Average grade per previous attempt (AGPA)	645	6.827	6.830	0.736	4.380	9
Male	692	0.668	1	0.471	0	1
External student (EXST)	692	0.423	0	0.494	0	1

Table 3 Grades "standard" or higher on the individual items and on the Master thesis, MSc BA cohorts, 2008-2010.

The standard grade is a 7. The FEB requires that at least 80% of the students attain a standard grade. The tables provides the results for gender, for internal and external students and for students with previous grades below (Low AGPA) and above the median (high AGPA) respectively. Internal students are student with a Bachelor from the FEB. The seven research skill items (Item 1- Item7) are: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7). Thesis represents the grades for the Master thesis.

	Item1	Item2	Item3	Item4	Item5	Item6	Item7	thesis
Female	93.5%	80.9%	81.3%	79.6%	83.0%	92.6%	86.5%	85.7%
Male	88.5%	75.1%	77.3%	73.6%	78.6%	84.2%	84.0%	80.1%
Internal	91.5%	76.9%	80.5%	77.7%	80.2%	88.5%	84.7%	83.5%
External	88.4%	77.1%	76.1%	72.7%	79.9%	85.0%	85.0%	79.9%
Low AGPA	86.4%	69.8%	71.9%	68.2%	72.5%	82.4%	78.4%	72.8%
High AGPA	94.4%	84.1%	85.7%	84.1%	87.9%	91.3%	90.7%	91.0%
All students	90.2%	77.0%	78.6%	75.6%	80.1%	87.0%	84.8%	81.9%

Table 4 Ordered probit analysis of the impact of thesis items scores and of entropy rotated thesis item score factors (Ertf: see appendices Table A-2) on the thesis grade, MSc BA cohorts 2008-2010.

The seven research skill items (Item 1- Item7) are: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7). AGPA is the average calculated grade on the previous courses. The table includes the results for gender, for internal and external students (with no Bachelor background from the FEB) and for the average previous grades (AGPA) Ertf represent the minimum entropy rotated thesis factor loadings on the seven items (see Appendices Table A2). Coef is the coefficient of the ordered probit analysis. The p-values of the z-scores (z) are given in the column P>z.

	Panel A			Panel B			
	Coef	z	P>z	result	Coef	z	P>z
Item1	0.269	3.370	0.001	Ertf1	2.848	18.650	0.000
Item2	0.434	6.870	0.000	Ertf2	0.641	3.980	0.000
Item3	0.528	8.090	0.000	Ertf3	0.336	1.320	0.187
Item4	0.456	6.940	0.000				
Item5	0.428	5.650	0.000				
Item6	0.294	4.180	0.000				
Item7	0.467	7.430	0.000				
AGPA	0.342	3.460	0.001	AGPA	0.324	3.370	0.001
Male	0.226	0.660	0.506	Male	0.164	0.490	0.622
External student	-0.130	-1.020	0.307	External student	-0.095	-0.760	0.444
Observations	645				645		
Wald Chi2	1009.83				991.91		
P (Wald Chi2)	(0.000)				(0.000)		
Pseudo R2	0.669				0.657		

Table 5 The impact of the exposure to teaching on students final thesis grades, students with different characteristics, MSc BA, cohorts 2008-2010.

The table provides ordered probit regressions that assess the impact of the overall exposure to teaching (OERST) on the thesis grades for several groups of students (all students, student with low and high grades respectively, male and female students respectively and external of internal students respectively) The constants (cut-off values) of the equations are not presented in the table. AGPA is the average calculated grade on previous courses. P-values are given between parentheses.

	All students	Low grades	High grades	Female	Male	Internal student	External student
OERST	0.379	0.674	0.345	0.291	0.425	-0.082	0.936
	(0.219)	(0.189)	(0.372)	(0.564)	(0.266)	(0.841)	(0.036)
AGPA	0.738	0.376	1.334	0.628	0.807	0.710	0.781
	(0.000)	(0.009)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male	-0.209	-0.311	-0.102			-0.169	-0.251
	(0.027)	(0.027)	(0.435)			(0.190)	(0.070)
External student	-0.134	-0.195	-0.139	-0.050	-0.180		
	(0.137)	(0.134)	(0.284)	(0.739)	(0.112)		
Observations	645	324	321	216	429	360	285
Wald Chi2	151.39	13.32	78.62	43.33	100.15	78.74	73.74
P (Wald Chi2)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R2	0.100	0.022	0.103	0.073	0.109	0.086	0.120

Table 6 The impact of items teaching and the scores on the seven items with a distinction between teaching internal and external students, MSc BA cohorts 2008-2010.

The table provides ordered probit regressions that assess the impact on seven assessment items: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7). All these assessment items are measured at a 5-point Likert-type scale, with 1 meaning below standard, 3 standard and 5 above standard. Scores 2 and 4 imply that teachers indicated an intermediate score between 1 and 3 or between 3 and 5 respectively. The constants (cut-off values) of the equations are not presented in the table. E1-E7 is the exposure to teaching of the items 1 till 7 respectively in previous courses. "E1 (or E2-E7) *External student" is the interaction between the exposure to teaching of the item multiplied by the external student dummy. AGPA is the average calculated grade on the previous courses. P-values are given between parentheses.

	Item1	Item2	Item3	Item4	Item5	Item6	Item7
Exposure to item teaching (E1-E7)	-0.450 (0.227)	0.445 (0.212)	-0.177 (0.675)	0.069 (0.831)	-0.706 (0.045)	-0.336 (0.348)	-0.391 (0.205)
E1 (or E2-E7) * External student	1.051 (0.044)	0.236 (0.656)	-0.150 (0.788)	1.262 (0.009)	1.401 (0.009)	0.876 (0.087)	1.172 (0.012)
AGPA	0.510 (0.000)	0.421 (0.000)	0.477 (0.000)	0.593 (0.000)	0.594 (0.000)	0.539 (0.000)	0.580 (0.000)
Male	-0.189 (0.049)	-0.272 (0.004)	-0.222 (0.019)	-0.122 (0.201)	-0.140 (0.149)	-0.208 (0.024)	-0.074 (0.433)
External student	-0.539 (0.028)	-0.104 (0.628)	-0.017 (0.917)	-0.554 (0.005)	-0.398 (0.017)	-0.468 (0.020)	-0.489 (0.018)
Observations	645	645	645	645	645	645	645
Wald Chi2	64.62	63.10	63.82	104.46	94.06	88.74	98.37
P (Wald Chi2)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R2	0.057	0.040	0.044	0.064	0.067	0.059	0.059

Appendices

Table A-1 The number of students and their scores on the seven items, MSc BA cohorts 2008-2010

The score 1 is "below standard", the score 3 is "standard", the score 5 is "above standard". A standard score is set by the faculty as a grade 7, based on a scale from 1-10, with 10 as the highest score. Some teachers indicated two scores, which resulted in intermediate scores 2 and 4. The items are: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7).

Score	item1	item2	item3	item4	item5	item6	item7
1	60	130	127	144	112	73	83
2	8	29	21	25	26	17	22
3	459	345	342	335	422	387	298
4	13	23	23	22	13	25	21
5	152	165	179	166	119	190	268
Total	692	692	692	692	692	692	692
Below standard	10%	23%	21%	24%	20%	13%	15%
Standard	66%	50%	49%	48%	61%	56%	43%
Above standard	24%	27%	29%	27%	19%	31%	42%

Table A-2 Minimum entropy rotated thesis factor (Ertf) loadings on the seven items by which faculty members score a thesis, MSc BA cohorts 2008-2010.

The seven research items are: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7). Ertf represent the minimum entropy rotated thesis factor loadings on the seven items.

	Ertf1 (Overall quality)	Ertf2 (Analysts)	Ertf3 (Doers)	Uniqueness
Item1	0.692	-0.162	-0.004	0.495
Item2	0.676	-0.009	-0.081	0.537
Item3	0.642	0.223	-0.040	0.537
Item4	0.739	0.174	0.030	0.423
Item5	0.705	-0.036	0.092	0.494
Item6	0.705	-0.008	-0.077	0.498
Item7	0.638	-0.023	0.102	0.582

T**able A-3 The impact of course hours and other student characteristics on the seven thesis assessment items, MSc BA cohorts 2008-2010.**

The table provides ordered probit regressions that assess the impact on seven assessment items: introduction (1), research framework (2), research design (3), analysis and discussion (4), conclusions and recommendations (5), report (6) and process (7). All these assessment items are measured at a 5-point Likert-type scale, with 1 meaning below standard, 3 standard and 5 above standard. Scores 2 and 4 imply that teachers indicated an intermediate score between 1 and3 or between 3 and 5 respectively. The constants (cut-off values) of the equations are not presented in the table. E1-E7 is the related relative number of hours exposed to the teaching of the items 1 till 7 respectively in previous courses. AGPA is the average calculated grade on the previous courses. Cut-off constants are excluded.

	Item1	Item2	Item3	Item4	Item5	Item6	Item7
Exposure to item teaching (E1-E7)	0.058	0.553	-0.256	0.637	-0.039	0.117	0.136
	(0.825)	(0.036)	(0.356)	(0.010)	(0.882)	(0.652)	(0.565)
AGPA	0.501	0.419	0.478	0.579	0.591	0.537	0.570
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male	-0.188	-0.271	-0.223	-0.130	-0.142	-0.215	-0.090
	(0.050)	(0.004)	(0.018)	(0.174)	(0.141)	(0.019)	(0.335)
External student	-0.098	-0.019	-0.054	-0.118	-0.047	-0.175	-0.039
	(0.309)	(0.832)	(0.551)	(0.193)	(0.614)	(0.054)	(0.662)
Observations	645	645	645	645	645	645	645
Wald Chi2	62.40	63.18	63.72	97.90	90.36	87.45	91.47
P (Wald Chi2)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R2	0.054	0.040	0.044	0.060	0.064	0.057	0.056

Table A-4 The number of students, student characteristics and final thesis grades by MSc BA specialization, cohorts 2008-2010.

	Male %	External student %	Mark=6	Mark=7	Mark=8	Mark=9	All grades
Business Development	74%	21%	15	40	17	4	76
Change Management	59%	20%	14	43	36	6	99
Finance	74%	64%	22	61	26	8	117
Information and Comm. Technology.	100%	57%	3	10	7	1	21
Marketing	47%	58%	8	44	36	4	92
Organizational & Managerial Control	67%	45%	22	37	13	1	73
Operations and Supply Chains	68%	46%	13	31	27	5	76
Small Business Management	76%	35%	21	39	13	1	74
Strategy and Innovation	64%	36%	7	31	20	6	64
Total	462	293	125	336	195	36	692
Percentage	67%	42%	18%	49%	28%	5%	100%

Table A-5 Percentage hours followed in methods teaching by type of MSc BA, cohorts 2008-2010.

The percentage of hours spent by students on the seven items of the intended program and the mean methodology teaching (100%=1680 hours).

MSc BA	Introd.	Res.fr.	Res.des.	An.disc.	Con.rec.	Report	Process	Mean
Business Development	42%	32%	19%	20%	20%	29%	47%	30%
Change Management	29%	33%	10%	12%	4%	37%	17%	20%
Finance	47%	46%	38%	42%	25%	21%	32%	36%
Information and Comm. Technology	54%	37%	20%	52%	52%	54%	54%	46%
Marketing	45%	35%	18%	46%	36%	52%	51%	40%
Organizational & Managerial Control	37%	39%	20%	36%	33%	36%	39%	34%
Operations and Supply Chains	51%	43%	34%	41%	19%	30%	29%	35%
Small Business Management	38%	10%	34%	28%	27%	28%	38%	29%
Strategy and Innovation	29%	37%	16%	25%	17%	28%	46%	28%
Total	41%	35%	24%	32%	23%	33%	37%	32%

Table A-6 The mean Likert-type scale scores on the seven Master thesis issues by MSc BA program, cohorts 2008-2010.

	Introd.	Res. Framew.	Res. Design	Analysis & Disc.	Concl. & Recom.	Report	Process	Mean	Thesis mark
Business Development	3.33	2.76	2.97	3.08	2.89	3.45	3.50	3.14	7.13
Change Management	3.37	3.34	3.11	2.91	3.01	3.47	3.64	3.27	7.34*
Finance	3.14	2.99	3.25	3.09	2.96	3.15	3.41	3.14	7.17
Information and Comm. Technology	3.29	3.14	3.43	3.33	2.90	2.81	3.52	3.20	7.29
Marketing	3.28	3.30	3.64	3.36	3.28	3.64	3.47	3.43	7.39**
Organizational & Managerial Control	3.01	2.95	2.88	2.73	2.67	3.08	3.34	2.95	6.90**
Operations and Supply Chains	3.41	3.12	3.17	3.45	3.16	3.63	3.70	3.38	7.32
Small Business Management	3.14	2.57	2.57	2.55	2.81	3.12	3.23	2.86	6.92**
Strategy and Innovation	3.58	3.70	3.44	3.19	3.23	3.39	4.11	3.52	7.39*
Total	3.27	3.09	3.15	3.06	3.00	3.35	3.53	3.21	7.21

*,** indicates significantly different (at 10% and 5%) from the overall mean of 7.21 based on a two sided test

Table A-7 Methods teaching and other determinants of the final thesis grade by MSc BA program, cohorts 2008-2010.

The analysis is based on ordered probit analysis, with the final grade of the Master thesis as the dependent variable. P-values are presented below the coefficients and are based on robust standard errors. Cut-off constants are excluded.

	Buss. Dev..	ICT	Change Mngmt	Finance	Marketing	Operations & Supply C	OMC	Small Bussiness	Strategy. & Innovation
Methods teaching	-4.070	2.887	-8.464	2.126	0.438	-0.958	-0.080	3.009	2.034
	(0.13)	(0.49)	(0.00)	(0.01)	(0.55)	(0.51)	(0.95)	(0.05)	(0.35)
AGPA	0.754	1.276	0.799	0.926	0.760	0.954	0.404	1.152	0.797
	(0.00)	(0.06)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)
Male	-0.775	-	0.404	-0.412	0.194	-0.357	-0.248	0.403	-0.190
	(0.03)		(0.17)	(0.09)	(0.42)	(0.13)	(0.39)	(0.19)	(0.54)
External student	-8.032	4.055	-3.465	0.316	1.202	-0.828	-0.669	1.206	-1.270
	(0.01)	(0.21)	(0.00)	(0.55)	(0.02)	(0.40)	(0.41)	(0.20)	(0.31)
Methods teaching *	23.269	-5.77	14.576	-1.296	-1.878	2.024	1.694	-5.479	2.912
External student	(0.02)	(0.37)	(0.00)	(0.32)	(0.78)	(0.42)	(0.45)	(0.03)	(0.47)
Observations	73	21	60	117	92	76	73	70	63
Wald Chi2	34.65	19.01	44.21	48.17	30.11	40.21	6.26	38.36	19.29
P (Wald Chi2)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.28)	(0.00)	(0.00)